Ontario Animal Health Surveillance Network

Author: Paul Innes - Veterinary Epidemiologist/OMAF
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Ontario Ministry of Agriculture and Food
and
Laboratory Services Division, University of Guelph

Ontario Animal Health Surveillance Network

"Conducting surveillance as a partnership to improve animal and related public health in Ontario."

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Note: Every reasonable effort is made to ensure that the information included in this report is accurate. However, is its subject to change without notice as new information comes to the attention of the OAHSN.

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Executive Summary

- Surveillance of animal health is important to support safe trade of livestock, animal products and foods of animal origin.
- Surveillance of animal health is also important to public health.
- Ontario has a strong network of professionals in veterinary science, animal health, food inspection and extension education. This infrastructure can be thought of as an Ontario Animal Health Surveillance Network (OAHSN).
- This report summarizes the infrastructure and surveillance coverage achieved by OAHSN and describes some activities of core network members.
- The Ontario Ministry of Agriculture and Food (OMAF) and the University of Guelph provide core members to OAHSN. This core group has veterinary specialties in epidemiology, pathology, animal health, outbreak investigation, technology transfer, outreach, food inspection, and research. These core members maintain links to other disease surveillance networks in Ontario at the interprovincial, national and international levels. Core members co-ordinate surveillance functions - from diagnosis to data interpretation to follow-up actions.
- Objectives of the OAHSN core group include:
    1. Continuous improvement of the Ontario Animal Health Surveillance Network to help give people confidence in Ontario livestock, animal products and foods of animal origin;
    2. Refinement of an early warning system for trends of animal diseases and their determinants in Ontario;
    3. Improving methods to link animal health, food safety and public health information;
    4. Conduct or co-ordinate specific investigative, corrective and preventive steps relevant to the work of OAHSN.

Buyers, producers, processors and consumers can have confidence in the health and safety of Ontario livestock, animal products and foods of animal origin, partially due to OAHSN and the day-to-day work of partners in the broad network. **The network has a mission to conduct surveillance as a partnership using information from government, academia, industry and private organizations to improve animal and related public health in Ontario.**

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Introduction and Objectives

Background & Introduction

Surveillance of animal health is increasingly important to food safety, related public health and the trade of animals and animal products. Confidence increases in the health of livestock and products from animals when there is systematic way to demonstrate freedom from, or control of important diseases. The maintenance of agriculture and safe trade, both within and beyond the borders of Ontario, is also important to our well being in Ontario. The sale of livestock and animal products and the value-added through further processing, contribute over $10 billion to the economy and employ over 100,000 people in Ontario. At any time, a zoonotic public health incident can occur or agriculture can be severely damaged from an outbreak of disease in livestock. International examples include the devastating impact of bovine spongiform encephalopathy (BSE or "Mad Cow Disease") and Foot and Mouth disease (FMD) in the UK, hog cholera in the Netherlands, and the recall of 25 million pounds of hamburger in the U.S.A. because of contamination with E. coli O157:H7 bacteria. Diseases of lesser notoriety can also cause millions of dollars damage to regional economies as result of damage to trade, as well as animal and public health costs.

The Ontario Ministry of Agriculture and Food (OMAF) recognizes the importance of animal health to the economy. OMAF and the Laboratory Services Division (University of Guelph) have dedicated resources to animal health surveillance by allocating staff as core OAHSN members, base operating funds and special investigative and outreach resources.

The objectives of this report are to: 1) describe the strength of the network involved in animal health surveillance in Ontario, 2) summarize the surveillance coverage of livestock in Ontario, and 3) illustrate the confidence the public can place in the health of livestock and the quality of animal products from Ontario.

Surveillance Objectives & Schematic Framework

The overall **objectives of the Ontario Animal Health Surveillance Network (OAHSN)** are:
1. To use a network of people involved in animal health, food inspection and extension education to continuously **improve surveillance of animal health in Ontario;**
2. To **interpret animal health data** and contribute to **appropriate follow-up actions** to improve livestock animal health;
3. To link, summarize, interpret and **act upon data that connect animal health, food safety and public health** using a broad network of partners;
4. To raise awareness and **reduce the risk of threats to animal health from beyond Ontario's borders;**
5. To **support animal health surveillance of the national government,** to maintain and demonstrate the health of Canadian livestock.

These objectives are achieved through the active maintenance and enhancement of early warning

systems for animal disease trends linking animal health, food safety and public health, through a network of partners. **This network meets the requirements of the Office International des Epizooties (OIE), as identified in the Sanitary and Phyto-Sanitary (SPS) sections of the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA).**

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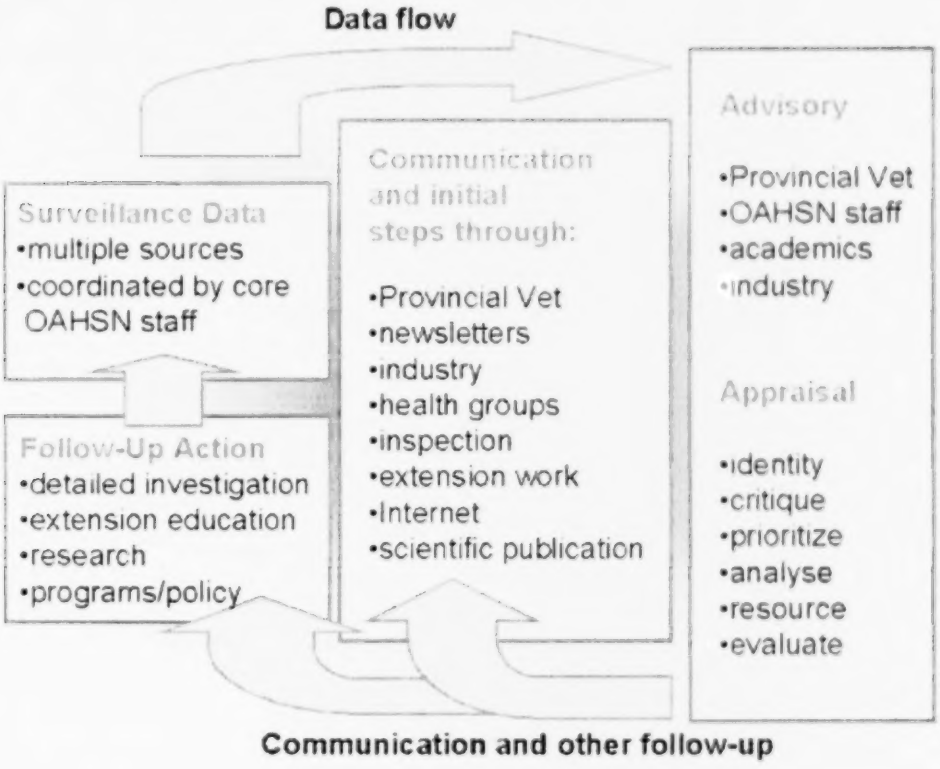
Figure 1 summarizes the cyclical flow of animal health data, information, appraisal and follow-up that comprises the surveillance work of the Ontario Animal Health Surveillance Network (OAHSN).

Figure 1: Schematic diagram of surveillance work of OAHSN.



The following text sections describe the surveillance infrastructure, coverage and activities of the OAHSN and its core group.

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Veterinary & Animal Health Infrastructure

The OAHSN strives to achieve its objectives by coordinating specific information and risk management activities related to **animal health surveillance through an infrastructure of individuals, organizations, systems and programs**, as follows:

Veterinary Science Infrastructure

In 2003 there were 3420 individuals licensed to practice veterinary medicine in Ontario. The licensing body, the **College of Veterinarians of Ontario** (CVO), maintains records of the primary professional activity of veterinarians. There were 691 veterinarians working in livestock medicine, 202 employed by government, and 101 Ontario veterinarians listing research as their primary activity.

The **Ontario Ministry of Agriculture and Food** (OMAF) provides veterinarians for surveillance work (such as outbreak investigation, extension education, epidemiology, food safety, inspection) in the **Veterinary Science** group in Fergus, and through the **Food Industry Division** and **Research and Corporate Services Division** in Guelph, Ontario.

The **Animal Health Laboratory** (AHL) of the University of Guelph serves as a system of veterinary diagnostic laboratories that are supported in part by public funding. This system provides full-service diagnostics for Ontario livestock producers and generates expert surveillance data. Its laboratories are located at two sites across the livestock regions of Ontario, providing diagnostic and consulting services for veterinarians and livestock owners. The laboratories are fully accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD) and are staffed by 17 professional and 46 technical specialists in veterinary pathology, microbiology (including Mycoplasma spp.), immunology / serology, virology, parasitology and toxicology. There are also several private veterinary laboratories in Ontario that provide basic microbiology and specific serologic and molecular biology testing of livestock samples.

The strength of the publicly funded outbreak investigation-consultation-extension unit comprised of Veterinary Science - OMAF and the Animal Health Laboratory (U of G) is unique and provides an important service to agriculture and the public of Ontario. This service becomes even stronger when put in collaboration with outbreak investigation capability of the Ministry of Health and Long Term Care, Health Canada and the Canadian Food Inspection Agency.

The main campus of the **University of Guelph,** including the **Ontario Veterinary College** (OVC) and the **Ontario Agricultural College** (OAC) is located in Guelph Ontario. This institution is world famous for its expertise in teaching and research in veterinary medicine, animal science and food science. The OVC offers courses in continuing education for veterinary practitioners. At the annual renewal of licenses to practice, veterinarians can document the time they committed to continuing education during the previous year.

Sub-groups of veterinarians that share similar interests in livestock medicine have been organized within Ontario such as the **Ontario Association of Bovine Practitioners** (OABP), the **Ontario Association of**

Swine Veterinarians (OASV), and the **Ontario Association of Avian Practitioners.**

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Communications

To facilitate communications, sample shipment and information flow (including ease of access to information, laboratories and specialists etc.). It should be noted that Ontario is essentially fully covered with telephone, electronic paging, facsimile, postal and private courier services. Electronic mail is available throughout most of the province. To facilitate face to face meetings, many veterinary, food inspection, animal agriculture, service and research organizations are located in or near Guelph Ontario, including, for example: OMAF headquarters, AHL, OVC, OAC, CVO, **Canadian Food Inspection Agency** (CFIA, regional headquarters), **Health Canada** - Health of Animals Laboratory, the **Canadian Animal Health Institute**, **Dairy Farmers of Ontario**, the **Dairy Herd Improvement** corporation, **Ontario Cattlemen's Association**, **Ontario Pork**, **Ontario Broiler Hatching Egg & Chick Commission**, the **Poultry Industry Council** etc. Core members of the OAHSN also communicate with and participate directly in various national committees such as the Canadian Animal Health Consultative Committee (CAHCC), the **Canadian Animal Health Surveillance Network** (CAHnet - coordinated by epidemiologists within the Animal Health Division of the Canadian Food Inspection Agency). Also, core members of the OAHSN subscribe to pertinent computerized list-servers on the Internet, to track emerging animal health issues internationally (e.g. ProMED, EpiVet-L, FSNet, AgNet, and AnimalNet), and routinely receive electronic international alerts from the Office International des Epizooties (OIE) through the Canadian Food Inspection Agency.
Animal health information is also communicated through:
Ceptor - Animal Health News by Veterinary Science - OMAF
(www.gov.on.ca/OMAFRA/english/livestock/ceptor/news.html),
Animal Health Laboratory Newsletter of the Laboratory Services Division, University of Guelph
(www.uoguelph.ca/labserv/ahl) and the CAHnet Bulletin of the Canadian Animal Health Network of the Canadian Food Inspection Agency (www.cahnet.org).

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Animal Health Monitoring and Food Inspection Systems

In Ontario, all commercial animal sales-yards, abattoirs, dead-stock and rendering operations must be licensed with either the **Ontario Ministry of Agriculture and Food** (OMAF), or the **Canadian Food Inspection Agency** (CFIA). This results in essentially complete licensing control, inspection coverage and veterinary access to all animals moving through commercial sales-yards, and abattoirs, and access to deadstock and rendering establishments.

In Ontario, all animals and carcasses slaughtered and dressed at all commercial abattoirs must be inspected by third-party inspectors, employed or contracted by OMAF or CFIA. Unlike some jurisdictions, **there are no exemptions from ante-mortem and post-mortem inspection**. All animals or carcasses suspected as being diseased are referred for veterinary consultation. In federal establishments, a resident veterinarian conducts an inspection and makes the appropriate carcass disposition. In provincially licensed abattoirs, the inspector phones a staff veterinarian and if deemed necessary, a locally appointed licensed veterinarian is brought in for final disposition. If required, samples are submitted to a veterinary diagnostic laboratory for confirmatory testing. Approximately 413 inspectors (273 federal, 140 provincial) and 176 veterinarians (60 federal, and 116 provincially appointed) serve full or part time in this role in Ontario.

A good example of systems that link animal health, food safety and product quality data are the dairy testing programs for somatic cell counts (SCC) and anti-microbial residues in milk. In Ontario, random milk samples from all dairy farms are tested for SCC and anti-microbial residues. This amounts to over 200,000 tests per year conducted at the University of Guelph for the Dairy Farmers of Ontario. In addition, over 90% of all tanker-truck loads are tested for anti-microbial residues before being off-loaded at dairies. Any suspect loads are held pending confirmatory and trace-back testing of all farm bulk-tanks that contributed to the suspect load. These data are monitored by the OAHSN for unusual trends. Dairy Farmers of Ontario milk quality staff follow up with on farm investigations.

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Legal Authority and Obligations

Under authority of the Livestock Community Sales Act, Meat Inspection Act, and the Dead Animal Disposal Act of Ontario, it is illegal (punishable by fine or imprisonment) to operate an animal sales-yard, abattoir, deadstock or rendering establishment in Ontario, without a license and its associated inspection by government controlled inspectors or veterinarians. Regulations include legal requirement of such facilities to maintain records of the source and disposition of livestock and carcasses. This facilitates tracing animal movement.

The transportation of non-ambulatory livestock is controlled under a regulation of the Livestock and Livestock Products Act. No animal unable to stand without assistance is permitted to be transported without being examined by a veterinarian and certified as fit for transport directly to slaughter. In Ontario veterinarians are required to examine all downer animals before transport and submit a report on the status of the animal to OMAF.

Under the Veterinarians Act of Ontario, it is illegal (punishable by fine or imprisonment) to practice veterinary medicine in Ontario without a license from the College of Veterinarians of Ontario (CVO). Licensing is dependent on passing proficiency examinations administered by the National Examinations Board.

Under the Health of Animals Act of Canada, all veterinarians in Canada are required by law to report as quickly as possible to federal authorities, any suspect cases of reportable diseases among animals. See Appendix I for the list of officially notifiable and reportable diseases in Canada as of January 2003. Note that the list includes diseases designated by the Office International des Epizooties (OIE) as "List A", many OIE "List B", plus some additional diseases. As a member of OIE, Canada is obligated to submit disease reports to the OIE. Ontario fully supports Canada's obligations to the OIE and World Trade Organization (WTO) through the Canadian Animal Health Network (CAHnet).

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The Ontario Animal Health Surveillance Network (OAHSN)

OMAF supports animal health in Ontario and commits resources to the core of the Ontario Animal Health Surveillance Network (OAHSN). **The mission of OAHSN is to conduct surveillance as a partnership to improve animal and related public health in Ontario.** The network is led by Ontario's Provincial Veterinarian. The core group includes specialists in veterinary epidemiology, pathology, meat inspection and electronic data management. Appendix II identifies the core members of the OAHSN, their affiliations, work areas and contact numbers. The group has direct communications links to animal industry, veterinary practice, laboratory, meat inspection, research, extension education and policy, individuals and organizations, at the provincial, national (such as CAHnet) and international levels. These linkages help co-ordinate core surveillance activity related to animal health in Ontario. And these linkages complete the overall Ontario Animal Health Surveillance Network. The overall objectives of the OAHSN are stated in Section 2.2 of this document.

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Surveillance Coverage of Livestock Populations At Risk

The following sections describe surveillance coverage of livestock populations at risk of disease in Ontario. Appendix III summarizes the data in table format.

Dairy Cattle

All farmers that produce and sell bovine milk or cream in Ontario must be licensed by an independent organization known as the Dairy Farmers of Ontario (DFO). There were 7557 producers selling milk to the DFO in September 1999. Ninety-five percent of dairy herds are geographically located in southern Ontario, especially southwestern and eastern Ontario. Although the average size of dairy herds in Ontario is approximately 50 cows, DFO quota statistics suggest that approximately 20% of mature dairy cows are located within 5% of the herds.

In Ontario, 117,264 cattle were slaughtered at Provincial abattoirs in 2002. All of these animals underwent ante-mortem and post-mortem inspection.
There are 46 livestock auction markets licensed and under veterinary inspection in Ontario. Reports from veterinary inspectors under contract with OMAF are monitored by the OAHSN for unusual trends.

The Animal Health Laboratory system of the University of Guelph in Ontario generates surveillance data from specimens from dairy herds. These data include specimens from full laboratory necropsy case-work-ups on dairy-breed cattle by full-time AHL veterinary pathologists, plus sample submissions from private veterinary practitioners. In 2002 it was estimated that these diagnostic submissions originated from approximately 3000 Ontario dairy farms dispersed throughout the province (see the map in Section 5).

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Beef Cattle

The Statistical Services Unit of OMAF reported that there are approximately 16,179 beef farms in Ontario with a total of 1,638,000 beef animals and calves.

There are 46 livestock auctions markets licensed in Ontario, all under veterinary inspection. Reports from these veterinarians on livestock that were refused sale due to health concerns or other reasons are monitored by OAHSN core members for unusual trends.

The Animal Health Laboratory system of the University of Guelph in Ontario generates surveillance data from specimens from beef herds. These data include specimens from full laboratory necropsy case-work-ups on beef-breed cattle by full-time AHL veterinary pathologists, plus sample submissions from private veterinary practitioners. The OAHSN estimates that these diagnostic submissions originate from approximately 1,000 beef cattle herds per year.

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Swine

There are approximately 4972 swine farms that market about 3,460,000 hogs in Ontario.

In Ontario, 464,575 pigs were slaughtered at provincially licensed abattoirs in 2002. These establishments slaughter market hogs, BBQ hogs, cull sows and boars. All of these animals underwent ante-mortem and post-mortem inspection.
There are 46 livestock auctions markets licensed in Ontario. Sows, feeder, stags, boars and market pigs are sold through these sales markets, under veterinary inspection. Reports from these veterinarians are monitored by the OAHSN for unusual trends.

The Animal Health Laboratory, University of Guelph generates expert surveillance data on swine submissions. These data include specimens from full laboratory necropsy case-work-ups by full-time AHL veterinary pathologists, plus sample submissions from private veterinary practitioners dispersed throughout the province.

The OASHN is linked to the Ontario Swine Health Information Plan run by Veterinary Science - OMAF. This program determines the health status of approximately 14,000 sows on 32 swine breeding herds in Ontario. A minimum of 4 herd health visits are conducted per year under this health plan by OMAF Veterinary Science veterinarians and private practitioners. Quantitative assessments of biosecurity, health, medications and vaccinations are conducted. Health status is determined by sampling and laboratory testing twice per year for *M. hyopneumoniae*, *A. pleuropneumoniae*, PRRS, Atrophic Rhinitis and clinical inspection for mange, TGE and dysentery.

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Traditional Poultry

There are approximately 1200 commercial poultry farms in Ontario, with a total of approximately 43,624,000 birds, including all classes of chickens and turkeys.
Much of poultry production in Ontario is done under various contract arrangements among different combinations of producers, breeding companies, feed companies and processors. Many of these organizations either directly employ or have retainer contracts with veterinarians who specialize in poultry practice. Within this well-organized industry, essentially all commercial breeder, multiplier and production poultry flocks are closely monitored for variations in health and production. Exceptions to this general rule may include small operations involving a few laying hens, meat, or "fancy birds" (the latter are often raised for show purposes). It is important to note that the AHL keeps its sample submission fees low, to encourage this latter group to submit samples. This assists in health surveillance of this group, and is important to the maintenance of the international health status in the larger commercial industry.

The Ontario Hatchery and Supply Flock Policy (OHSFP) provides monitoring and testing in Ontario that meets the national Canadian Pullorum-Typhoid and Hatchery Sanitation requirements, and the US National Poultry Improvement Program. The OHSFP includes mandatory testing for *Salmonella pullorum*, *S. gallinarum* and other paratyphoid infections, and can include additional testing for *Mycoplasma gallisepticum*, *M. synoviae*, and *M. meleagridis* (turkeys).

In Ontario, approximately 19,000,000 birds were slaughtered at provincially licensed abattoirs in 2002. All slaughter lots underwent ante-mortem and post-mortem inspection.

The Animal Health Laboratory of the University of Guelph generates surveillance data from poultry. These data include specimen examinations from full laboratory necropsy case-work-ups on traditional poultry, by full-time AHL veterinary avian pathologists, plus sample submissions from private veterinary practitioners.

The Poultry Industry Council, OMAF, and the University of Guelph have recently collaborated to create a critical mass of poultry health expertise that includes a new Health Management Veterinarian, a Pathobiologist and a Veterinary Epidemiologist. This will strengthen Ontario's capability in surveillance, technology transfer, diagnostics and related research in poultry.

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Small Ruminant

There are approximately 400,000 sheep, lambs and goats in Ontario.

In 2002, approximately 260,000 sheep, lambs and goats were slaughtered at provinically licensed abattoirs. All of these livestock underwent ante-mortem and post-mortem inspection.

There are 46 livestock auction markets licensed and under veterinary inspection in Ontario. These data are monitored for unusual trends.

The Animal Health Laboratory of the University of Guelph generates surveillance data from small ruminant submissions. These data include specimen examinations from full laboratory necropsy case-work-ups by full-time AHL veterinary pathologists, plus sample submissions from private veterinary practitioners.

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Equine

Survey work by Dr. R. Wright of Veterinary Science - OMAF and the equine industry estimated that there are 325,000 horses in Ontario.

One abattoir is licensed to slaughter horses in Ontario, and it is federally registered. All horses slaughtered at this abattoir undergo ante-mortem and postmortem inspection.

There are 46 livestock auction markets licensed and under veterinary inspection in Ontario. These data are monitored for unusual trends.

The Animal Health Laboratory of the University of Guelph generates surveillance data on equine specimens. These include full laboratory necropsy case-work-ups conducted by full-time AHL veterinary pathologists, plus sample submissions from private veterinary practitioners.

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Alternative Livestock

The raising and marketing of alternative livestock and products such as cervids, ratites and wild boar are becoming increasingly popular in Ontario. All such animals slaughtered for commercial purposes in Ontario, undergo ante- and post-mortem inspection at provincial or federally inspected abattoirs. Also, "fish farming" (aquaculture) is growing in importance. OMAF has extension personnel dedicated to such alternative livestock, and the AHL (University of Guelph) has pathologists available for such species.

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Dead-Stock

There are currently 31 licensed dead-stock collectors in Ontario. These businesses submit data to OMAF, indicating the number of each species they collect each month. These data are monitored for unusual trends. As an example, in 2002, the following dead-stock were collected: 31,533 cattle (dairy and beef); 56,439 calves; 185,569 swine; 124 small ruminants; and 2712 horses.

The next sections illustrate some examples of surveillance activities in Ontario.

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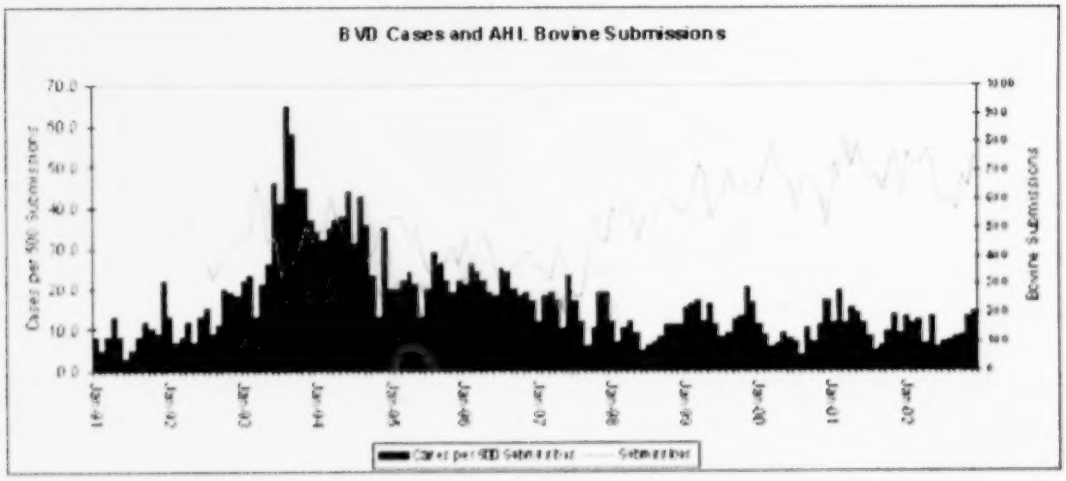
5.1 Bovine Virus Diarrhea

The **estimated prevalence of herds experiencing BVD problems has now returned to the relatively low levels seen in 1990-1992** (see graph below). OAHSN continues to monitor monthly patterns of BVD diagnoses in the Animal Health Laboratory, among veterinary practitioners and other relevant surveillance data. OAHSN partners conduct appropriate extension, outbreak investigation and recommend preventive steps to producers. Surveillance data from rendering facilities, community livestock sales, private practitioners and diagnostic laboratories helps to quantify, track and alert cattle industries to the increased risk of BVD in Ontario. During the epidemic in 1993-94, **multiple sources of surveillance information led to widespread extension education activity and a marked increase in vaccination for BVD by 1994-1995.**



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5.2 Dairy Health Surveillance Piggy-backed on Farm Financial Programs

In 1995, 1996, 1997 and 1999 health and health management questions were added to the input forms of the **Ontario Farm Management Analysis Project** (OFMAP) for 200-500 dairy herds. These data were summarized for veterinarians to help their dairy clients "**benchmark**" their herd health as compared to provincial estimates **for clinical mastitis, lameness, milk fever and calf mortality**. Epidemiological analyses indicated that **these disease events often cluster in herds**, and certain management factors are associated with lower rates of these problems. These results were included in personalized reports for the participating producers and summarized in farm magazines, newspapers and Veterinary Science newsletter "Ceptor - Animal health News". Further analyses of these OFMAP surveillance data are ongoing. Health questions were added to the **Ontario Dairy Farm Accounting Program in 1998 and 1999-2000** generously supported by the ODFAP staff and the **Dairy Farmers of Ontario**. A sample of the results from this work is included in the two articles on dairy herd health and sentinel herds below.

Dairy Herd Health Report Card

Herd health data were collected from **482 dairy farms in 1995 and from 383 farms in 1996** while conducting Ontario Farm Management Analysis Project visits. This information may help veterinarians carry out diagnostics with dairy producer clients.

From two years combined data, the average number of milking cows was 51 (range = 14 - 206). The average SCC was 204,000 (range = 49,000 - 600,000) and milk production was 3,711 hL (range = 852 - 17,567). The cost per dollar of production was $0.66 (range = 0.33 - 1.84). Based on these data the herds in this survey were judged to be representative of the industry in Ontario.

Table 1 below provides benchmark values for some **important herd health factors and production limiting diseases**. The percentiles indicate the percentage of herds that fall below that given value. For example, the average number of cases of clinical mastitis per 100 cows per year was 24, but 25% of the herds had fewer than 10 cases and 75% had fewer than 34.

Table 1: Dairy herd health survey 1995 - 1996

Cases/100 cows/year	Average	Range	25th Percentile	75th Percentile
Mastitis	24	0-100	10	34
Milk Fever	6.3	0-67	2	9
Downer Cows	4.4	0-73	0	6
Lameness	10.5	0-98	3	14

Abortions	3.3	0-25	0	5
Culls	26.6	3-72	19	35
LDA	2.6	0-19	0	4
Strawberry Foot Rot	7.4	0-96	0	8

Heifer mortality averaged 11.5% (range = 0 -100) with 25% of herds less than 6% and 75% of herds less than 17% mortality. Only 7% of farms **kept livestock medicines in a locked storage** area.

Lameness rates were significantly greater for free-stall herds as compared to tie-stall operations based on logistic regression models adjusting for the random effect of region of Ontario. Dairy producers should be aware of these increased risks when converting to free-stalls.

Only 1.4% of producers reported a veterinary diagnosis of **Johne's Disease** within the previous 10 years. However, 7% were either unsure or unaware of the disease. Because of the growing significance of Johne's in issues of trade and possibly public health, further education and improved surveillance for this disease may be warranted. The survey is ongoing and results will be updated periodically in CEPTOR newsletter of Veterinary Science of OMAF.

Paul Innes and David Alves, Veterinary Science; Al deJong, and Farm Business Management Specialists OMAF

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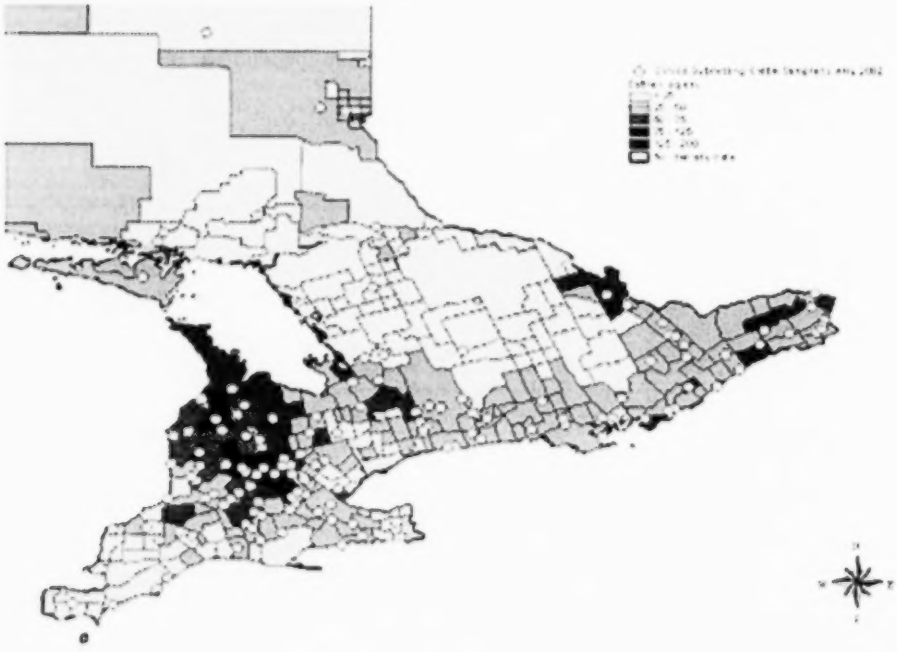
5.3 Geographic Information Systems - Progress for Surveillance

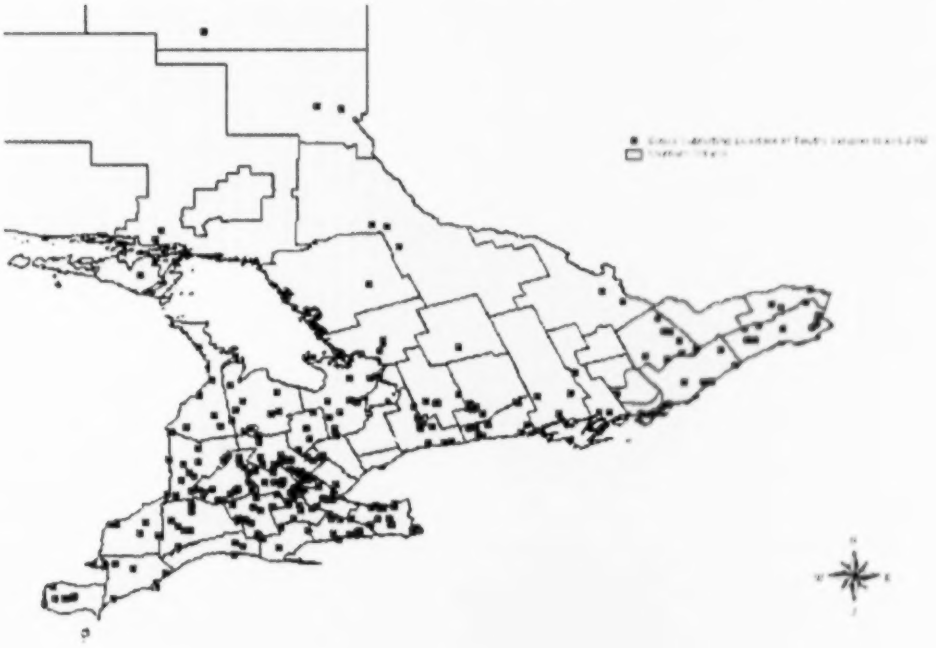
Progress is being made to link databases to permit **mapping of surveillance data** at the postal code and township level using geographic information systems software. The map below demonstrates the coverage of the cattle areas of the province by private veterinarians who routinely use the two regional laboratories of the Animal Health Laboratory of the University of Guelph for full service diagnostics. This helps to illustrate the broad reception of surveillance data by these regional laboratories.

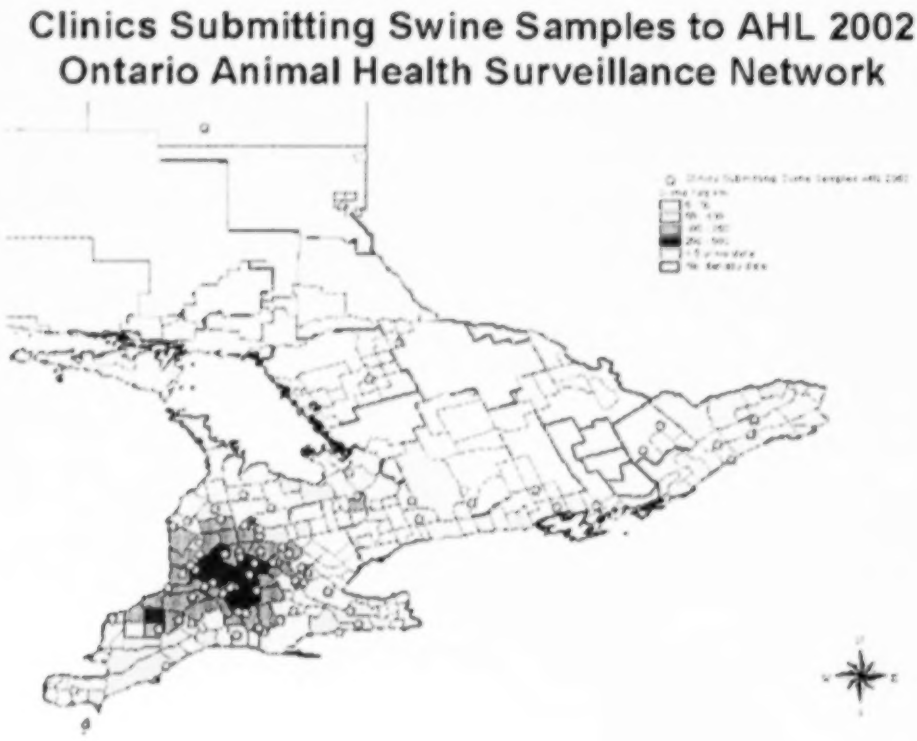
Clinics Submitting Bovine Samples to AHL 2002
Ontario Animal Health Surveillance Network



Bruce McNab - OMAF

Clinics Submitting Livestock Samples to AHL 2002
Ontario Animal Health Surveillance Network





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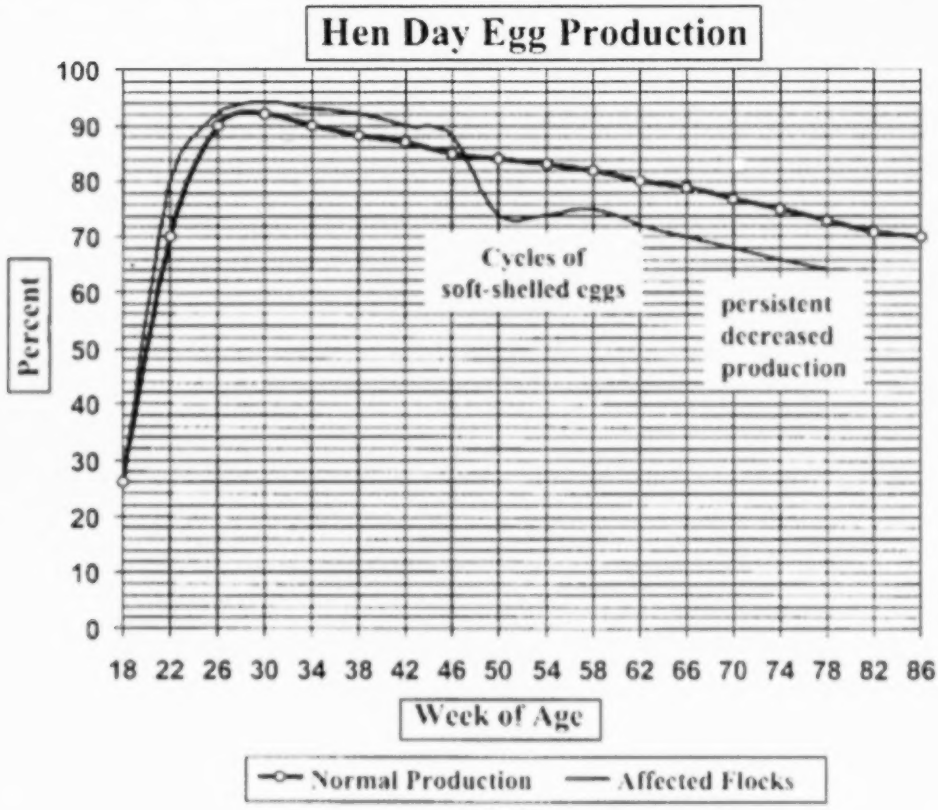
5.4 Production Loss in Layer Flocks

This investigation was a **good example of the surveillance network using outreach and epidemiology from Veterinary Science of OMAF and diagnostics from the Animal Health Laboratory of the University of Guelph**. From April 1998 to May 1999, 11 layer flocks in southwestern Ontario **reported unexpected production loss that persisted throughout the lay period (see Figure 1 below).** The flocks experienced a significant decrease (5-15%) in egg production at a mean of 53 weeks of age (range 37-70 weeks) which continued until the end of lay. Owners reported misshapen eggs occurring in 7-10 day cycles, with normal eggs between these periods. The cases were statistically clustered in a relatively small region in southwestern Ontario.

Figure 1: Pattern of production loss in 11 layer flocks in Ontario



Diagnostic laboratory records were used in a case-control approach to conclude the most likely diagnosis in these flocks was infectious bronchitis virus (IBV). Genome studies showed **two viral isolates from affected flocks to be distinct from Ontario isolates previously analyzed** and virus neutralization indicated cross-neutralization with antiserum to the Connecticut and Arkansas DPI serotypes, and no significant neutralization with antiserum to Massachusetts serotypes. **Recommendations** from this investigation have resulted in: **extension work to change local vaccination protocols** in layers; **biosecurity** discussions at poultry industry meetings; **increased awareness about IBV** in layers; **the need for ongoing genomic surveillance of IBV isolates**; and **follow-up exposure studies** with the unique serotypes isolated. Recently, placements of sentinel birds are providing more insight into Ontario IBV isolates.

David Alves and Paul Innes (Veterinary Science - OMAF), Beverly McEwen (Animal Health Laboratory - University of Guelph)

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5.5 Modeling the Impact of Redistributing Test Positive Heifers in Ontario
Export testing and redistribution of test positive dairy heifers in Ontario - A computer simulation risk assessment

W. Bruce McNab, Neil G. Anderson and David M. Alves, Ontario Ministry of Agriculture and Food

The export contract for dairy heifers is often conditional on negative test results for endemic diseases such as bovine virus diarrhea, paratuberculosis and neosporosis. The contracts may lead to the retention and often redistribution of test positive animals within Ontario. This report describes computer simulation

work to assess the long-term risk to Ontario dairy herds following redistribution to non-source herds.

An Ontario livestock export agent provided information for the model. The information included the types of testing requested in contracts, estimates of the number of animals and herds, the rate of test failure, and the rate of return of test-positive heifers to their herd of origin vs. redistribution to other Ontario herds. A computer model was written in visual basic to run a large macro in Microsoft Excel'97 in conjunction with Palisade's @Risk simulation software. A typical 5-year simulation was run 1000 times for a generic disease using 7000 dairy herds at risk in Ontario and annual export shipments varying from 20,000 to 30,000 heifers. The between-herd prevalence varied from 5% to 25% at the start of each of the 5-year simulations. The number of test-negative animals exported from any herd ranged from 1 to 15. The within-herd prevalence varied from 10% to 30%. The probability of a test-positive animal going to a different (non-source) herd in Ontario ranged from 10% to 35%. The probability of a previously negative herd becoming infected, as a result of receiving a test-positive animal, was allowed to range from 75% to 99%.

Under the above input conditions, the simulation results were as follows. The number of newly infected herds ranged from 400 to 1350 with a mode of 950. The between-herd prevalence increased from an initial range of 5 to 25%, to a range of 12 to 43% after five years. The model suggests that we might expect 925 previously negative herds could become infected after five years as a result of these redistribution practices. From the upper end of the distribution, the model suggests that we may be 95% confident that no more than 1175 such herds will become infected. The model also suggests this number can be markedly reduced with improved herd biosecurity.

These are preliminary results only and the model is undergoing refinement. Nonetheless, early results indicate that there can be a significant impact to our dairy industry when we redistribute a relatively small proportion of test-positive animals in the provincial herd subsequent to export testing and when biosecurity is not maintained.

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5.6 Pilot Project to Assess Antimicrobial Resistance in Ontario Livestock

Antimicrobial Resistance Among Bacterial Isolates from Food Producing Animals in Ontario. B. McEwen[1], N. Smart[1], C. Poppe[2], M. Neale[1], M. Archambault[1], A. Valdivieso[2], D. Alves[3], B. McNab[3], A. Rehmtulla[3], S. McEwen4. [1]Animal Health Laboratory, University of Guelph, Guelph, Ontario, N1H 6R8, [2]Health of Animals Laboratory, Health Canada, Guelph, [3]Ontario Ministry of Agriculture and Food, 4Department of Population Medicine, University of Guelph.

There is increasing concern about the emergence and pattern of antimicrobial resistance among bacteria isolated from foods of animal origin. A collaborative research project between the Animal Health Laboratory, Health Canada, OMAF and the Dept. Population Medicine (OVC), to examine patterns of antimicrobial resistance in food-producing animals was completed in July 2001.

The study documented patterns of bacterial resistance to antimicrobials commonly used in veterinary and human medicine among approximately 500 isolates from food animal veterinary cases submitted to the Animal Health Laboratory, University of Guelph. Similarly, antimicrobial resistance profiles of over 300 isolates obtained from fecal samples of broiler chickens, market hogs, and beef collected at provincially inspected abattoirs from across Ontario were documented.

Antimicrobials used were consistent with those used in the National Antimicrobial Resistance Monitoring System (NARMS) of the United States and a similar system, DANMAP, in Denmark. Antimicrobial sensitivity testing was in accordance with NCCLS guidelines.

The results of the study indicate:

- That antimicrobial resistance of Salmonella and E. coli serotypes occurs in food producing animals in Ontario and the bacteria are often resistant to multiple antimicrobials.
- There are significant differences in antimicrobial resistance amongst isolates from the healthy abattoir specimens and from clinical cases of the same species;
- There are significant differences in antimicrobial resistance among the various species of food-producing animals.

- Salmonella Typhimurium var copenhagen phage type DT104 was the most frequently isolated antimicrobial resistant Salmonella serotype. isolated. Salmonella were recovered from 7.2% of intestinal contents from healthy chickens, cattle and swine in Ontario abattoirs.

Antimicrobial resistance is an issue for those that produce, process and sell food, consumers and government agencies. Resistance monitoring of the microflora of healthy and diseased animals is critical to making informed decisions about factors affecting consumer's health and determining the effective use of human and animal health drugs.

Testing bacterial isolates from abattoir and clinical specimens provided useful baseline information on the frequency and occurrence of antimicrobial resistant bacteria that could potentially reach the consumer. This is one step in the process to determine the risks associated with antimicrobial use in food-producing animals. These surveillance data could be used to evaluate the risks associated with the use of antimicrobials in livestock. This research will form the basis of one component of ongoing surveillance of antimicrobial resistance in agriculture.

The above project is funded by the Enhanced Food Quality and Safety Research Fund, Ontario Ministry of Agriculture and Food.

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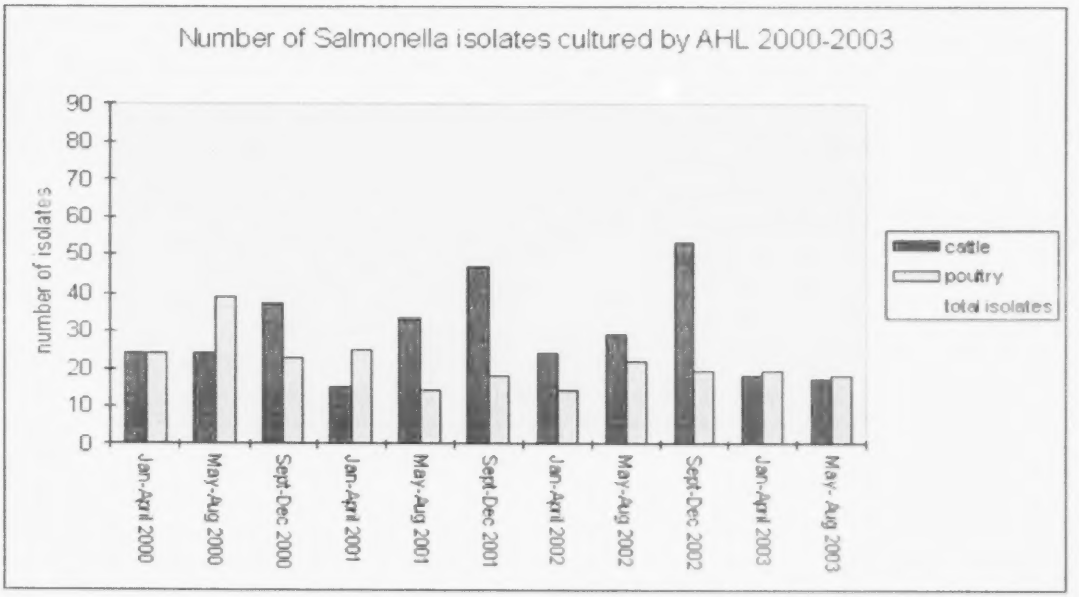
5.7 Salmonella Surveillance

The graph below is a time series of isolates of Salmonella from clinical samples submitted to the Animal Health Laboratory, University of Guelph. Characterization of these isolates is conducted at the reference laboratory of Health Canada. Private veterinarians work with their livestock clients to resolve these infections on-farm, often in collaboration with veterinarians at Veterinary Science -OMAF and at the Animal Health Laboratory - U of G. The trend in the frequency of Salmonella data is being followed closely, including the occurrence of any widely multiresistant clones of strains such as S. Typhimurium DT104. In 2002, S. Typhimurium accounted for 13% of all the Salmonella isolates cultured by the AHL. Extension education messages about farm biosecurity, sanitation, the public health risk to those in direct contact with infected animals have appeared in animal health newsletters (Ceptor - Veterinary Science - OMAF; Animal Health Laboratory Newsletter - Laboratory Services Division, University of Guelph).



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5.8 B.S.E. Surveillance in Ontario

Bovine spongiform encephalopathy (BSE or "mad cow disease") has had a negative impact on the cattle and beef industries in the United Kingdom and the European Union since 1988, and here in Canada in 2003. Internationally, surveillance for BSE has become increasingly important to facilitate trade. To assist Canada in demonstrating active surveillance for BSE, the OAHSN contributes in the following manner. Appropriate tissue samples from bovine cases exhibiting nervous signs submitted to the AHL, as well as any animal with microscopic brain lesions, are forwarded to the national laboratory system according to the national BSE surveillance protocol of the Canadian Food Inspection Agency. Certificates from downer cattle are also monitored for unusual trends. This provides a traceback mechanism on these animals. All samples in this surveillance for BSE in Ontario have been negative to date. The other provinces of Canada also submit samples as part of the national surveillance program. Veterinarians from OMAF are working closely with officials from the federal government on BSE surveillance.

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5.9 On-farm Investigation of Verotoxigenic E. coli in Well Water

This investigation was an example of collaborative investigative work between OMAF, Ontario Ministry of Health and Long Term Care, and Health Canada. A young child on a dairy farm was ill with a prolonged episode of severe diarrhea. The provincial public health laboratory confirmed the isolation of E. coli O157:H7. The private veterinarian involved with the dairy farm suspected the farm environment and alerted Veterinary Science - OMAF. E. coli O157:H7 was isolated from 63% of cattle on the farm through testing by Health Canada. Well water samples were also positive after special culture techniques were used by Ministry of Health and Long Term Care. Isolates from the water, the cattle and the child were Phage Type 14 and were virtually identical by pulsed - field gel electrophoresis. This collaborative work illustrated the potential risk of dairy farm well water as a potential source of E. coli O157:H7. Routine screening tests for E. coli in well water may not detect this vertoxigenic pathogen. An OMAF hydrogeologist conducted an on-farm audit of the well and the farm manure management. Recommendations were made regarding proper decommissioning of old wells, improvement to the main well head and farm drainage. For further details consult the reference below.

S.G. Jackson, R. B. Goodbrand, R. P. Johnson, V. G. Odorico, D. Alves, K. Rahn, J. B. Wilson, M. K. Welch and R. Khakhria. Epidemiol. Infect. (1998) 120:17 - 20.

5.10 Post-weaning Multisystemic Wasting Syndrome of Swine

In late March of 1997, coordinators of CAHnet (the Canadian animal health network) sponsored a national telephone conference-call about a condition described as a "post-weaning multi-systemic wasting syndrome" (PMWS) in swine A definitive cause of the syndrome has not yet been established, although a strain of porcine circovirus is suspected as a risk factor. Participants on the conference-call agreed that veterinarians and producers should be on the "look-out" for this syndrome and that more data were needed to further define the syndrome and its relative importance.

Subsequent to the conference call, members of the core group of OAHSN responded in the following manner: i) in cooperation with veterinarians from western Canada, a PMWS information sheet and case definition were written and circulated to Animal Health Laboratories in Ontario; ii) a presentation on PMWS was made at a meeting of the Ontario Swine Practitioners Association, to alert veterinary practitioners of the potential syndrome and to advise them on laboratory sample submission protocols; iii) an article and information sheet was distributed to essentially all swine producers and advisors in Ontario via the OMAF publication "Pork News and Views" (May'97 issue, circulation > 6000); iv) histopathology slides from cases in western Canada were distributed to Animal Health Laboratories in Ontario; v) provincial funding authorities were made aware of the need for a case-control study in Ontario, if case numbers warrant such a study; and vi) inspectors at provincially inspected abattoirs were alerted to look for signs of PMWS and encouraged to submit additional samples especially in BBQ weight slaughter pigs. Follow-up research was conducted by Population Medicine at the University of Guelph.

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5.11 Investigation and Reporting of Emerging Issues

The following examples illustrate how the OAHSN monitors and responds to unusual or emerging threats to animal or related public health.

Salmonella Newport in Ontario Dairy Herds

In the summer of 2003, members of the OAHSN, in conjunction with private veterinarians and Health Canada, were involved in 3 Salmonella Newport investigations. Fecal samples from a dairy farm were sent in to the AHL, University of Guelph. A multi-drug resistant Salmonella sp. was cultured and the samples were forwarded to Health Canada for serotyping. Once the serotype of Newport was confirmed, the Provincial Veterinarian and the local Public Health Unit were notified. OMAF veterinary scientists quickly carried out a series of risk management procedures. These included: 1) notification to the private practitioner of the culture results; 2) notification to the Dairy Farmers of Ontario to ensure that milk from affected cows was withheld; 3) assisting in the location of animals that had left the farms; 4) follow up cultures to determine the distribution and prevalence of the disease within the affected herd; 5) alerting all large animal practitioners to the presence of this emerging pathogen and recommending biosecurity procedures.

Bovine Tuberculosis in an Ontario Dairy Herd

A dairy herd in the Peterborough area was diagnosed with bovine tuberculosis in 2002. The practitioner noticed suspicious lesions on post-mortem and sent tissue samples in to the Animal Health Laboratory at the University of Guelph. The lab diagnosed bovine tuberculosis and the Provincial Veterinarian and the Canadian Food Inspection Agency were notified. The CFIA quarantined the herd and conducted a thorough investigation through testing and traceouts. OMAF published a disease alert to all large animal practitioners. OMAF, the CFIA, Health Canada and the Ontario Ministry of Health and Long Term Care (MOHLTC) co-operated in the investigation to minimize the risk of any human or animal exposure to contaminated product. The outbreak was confined to a single farm, and no human cases were reported.

West Nile Virus in Ontario Horses

In the fall of 2002 and the spring of 2003, OMAF conducted a serologic study of Ontario horses to estimate the prevalence of exposure to West Nile virus (WNv). Blood samples were collected from horses throughout Ontario and serum tested for the presence of WNv antibodies. OMAF's veterinary science group led the project team whose other members included the Animal Health Laboratory at the University of Guelph and private practitioners. Results indicated an overall seroprevalence of 6%. The prevalence was highest in the southwest and southern regions of the province, and at certain racetracks. This information was used to target particular regions and sectors of the horse industry for WNv prevention and education in 2003. OMAF also worked closely with Ontario's 17 public health units, sharing information regarding the current number of positive birds, horses and humans in specific regions.

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Last Updated: February 18, 2004

Ontario Animal Health Surveillance Network

Author: Paul Innes - Veterinary Epidemiologist/OMAF
Creation Date: 7 October 2003
Last Reviewed: 7 October 2003

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Overall Conclusions & Invitation for Comment

The previous sections illustrate Ontario's extensive animal health surveillance network and its ability to detect incursions of serious animal diseases and to rapidly communicate pertinent information to appropriate authorities and organizations. In partnership with such organizations, the OAHSN core group also facilitates or directly participates in appropriate follow-up actions in a timely and relevant manner. This helps to identify and manage risks to animal health in Ontario, and beyond. This should encourage confidence among the public in Ontario livestock and animal products, including foods of animal origin.

This is the third publication of this document describing the Ontario Animal Health Surveillance Network. It is by no means perfect, but the authors believe it to be a step in the right direction. You are invited to use this document to help explain the role, capability and concept of animal health surveillance in Ontario and to submit constructive comments to help improve future editions of this document. Please see Appendix II for a list of core members of the OAHSN. Thank you.

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Appendices

Appendix I

Reportable Diseases

Item	Disease
1.	African horse sickness
2.	African swine fever
3.	anaplasmosis
4.	anthrax
5.	bluetongue
6.	bovine spongiform encephalopathy
7.	bovine tuberculosis (*M. bovis*)
8.	brucellosis
9.	chronic wasting disease of cervids
10.	contagious bovine pleuropneumonia
11.	contagious equine metritis
12.	cysticercosis

12.1	dourine
12.2	equine encephalomyelitis, eastern and western
13.	equine infectious anaemia
14.	equine piroplasmosis (*B. equi and B. caballi*)
15.	foot and mouth disease (FMD)
16.	fowl typhoid (*Salmonella gallinarum*)
16.1	glanders
17.	highly pathogenic avian influenza
18.	hog cholera (classical swine fever)
19.	lumpy skin disease
20.	Newcastle disease
21.	peste des petits ruminants
22.	pseudorabies (Aujeszky's disease)
23.	pullorum disease (*S. pullorum*)
24.	rabies
25.	Rift Valley fever
26.	rinderpest
27.	scrapie
28.	sheep and goat pox
29.	swine vesicular disease
30.	trichinellosis
31.	Venezuelan equine encephalomyelitis
32.	vesicular stomatitis

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Schedule VII

(Subsection 91.2(1))

Immediately Notifiable Diseases

Item	Disease
1.	aino virus infection
2.	akabane disease
3.	avian chlamydiosis (*C. pscittaci*)
4.	avian encephalomyelitis
5.	avian infectious laryngotracheitis
6.	besnoitiosis
7.	Borna disease
8.	bovine babesiosis (*B. bovis*)
9.	bovine ephemeral fever

10.	bovine petechial fever
11.	contagious agalactia
12.	contagious caprine pleuropneumonia
13.	dourine
14.	duck hepatitis
15.	egg drop syndrome (adenovirus)
16.	enterovirus encephalomyelitis (Teschen disease)
17.	epizootic haemorrhagic disease
18.	epizootic lymphangitis
19.	equine encephalomyelitis, western and eastern
20.	fluvalinate-resistant Varroa mite
21.	fowl cholera
22.	glanders
23.	goose parvovirus infection (Derzsy's disease)
24.	heartwater (cowdriosis)
25.	hendra virus
26.	herpes virus of cervidae
27.	Ibaraki disease
28.	Japanese encephalitis
29.	louping ill
30.	Nairobi sheep disease
31.	Nipah virus
32.	screwworm (*Cochliomyia hominivorax and Chrysomyia bezziana*)
33.	small hive beetle (*Aethina tumida*)
34.	theileriasis
35.	tick-borne fever (*Cytoecetes phagocytophilia*)
36.	tissue worm (*Elaphostrongylus cervi*)
37.	trypanosomiasis (exotic to Canada)
38.	turkey viral rhinotracheitis or swollen head disease in chickens
39.	viral haemorrhagic disease of rabbits
40.	Wesselbron's disease
41.	West Nile fever

Schedule VIII

(Subsection 91.2(3))

Annually Notifiable Diseases

Item	Disease
1.	acarine disease
2.	actinomycosis
3.	American foul brood
4.	atrophic rhinitis
5.	avian infectious bronchitis
6.	avian leukosis
7.	avian salmonellosis
8.	avian spirochaetosis
9.	avian tuberculosis
10.	blackleg
11.	botulism
12.	bovine genital campylobacteriosis
13.	bovine malignant catarrhal fever
14.	bovine viral diarrhoea or mucosal disease
15.	caprine arthritis-encephalitis
16.	caseous lymphadenitis
17.	coccidiosis
18.	contagious ophthalmia
19.	contagious pustular dermatitis
20.	dermatophilosis
21.	distomatosis (liver fluke)
22.	duck virus enteritis
23.	echinococcosis or hydatidosis
24.	enterotoxaemia
25.	enzootic abortion
26.	enzootic bovine leucosis
27.	equine coital exanthema
28.	equine influenza
29.	equine rhinopneumonitis
30.	European foul brood
31.	filariasis
32.	foot-rot

33.	fowl pox
34.	haemorrhagic septicemia
35.	horse mange (*Psoroptes equi*)
36.	equine viral arteritis
37.	infectious bovine rhinotracheitis (IBR or IPV)
38.	infectious bursal disease (Gumboro disease)
39.	infectious coryza
40.	intestinal salmonella infections
41.	listeriosis
42.	maedi-visna
43.	Marek's disease
44.	melioidosis
45.	avian mycoplasmosis (*M. Gallisepticum*)
46.	myxomatosis
47.	nosematosis of bees
48.	other clostridial infections
49.	other pasteurelloses
50.	ovine epididymitis (*Brucella ovis*)
51.	ovine pulmonary adenomatosis
52.	paratuberculosis (Johne's disease)
53.	porcine reproductive and respiratory syndrome (PRRS)
54.	Q fever
55.	*Salmonella abortus ovis*
56.	*Salmonella abortus equi*
57.	sheep mange (scab)
58.	strangles
59.	swine erysipelas
60.	toxoplasmosis
61.	transmissible gastroenteritis (TGE)
62.	trichomoniasis
63.	tularaemia
64.	ulcerative lymphangitis
65.	vibrionic dysentery
66.	warble infestation

Appendix II

Core Members of the OAHSN

Name & Affiliation	Training / Specialty	Contact Numbers
Dr. David Alves, Provincial Veterinarian Veterinary Science, OMAF 3 SE, 1 Stone Road W Guelph, ON N1G 4Y2	DVM PhD epidemiology, surveillance, field investigation and technology transfer	phn: (519) 826-3127 fax: (519) 826-3254 david.alves@omaf.gov.on.ca
Dr. Paul Innes Veterinary Science, OMAF, RR#1 Fergus, ON Canada, N1M 2W3.	DVM MSc epidemiology, surveillance	phn: (519) 846-3407 fax: (519) 846-8101 paul.innes@omaf.gov.on.ca
Dr. Beverly McEwen, Animal Health Laboratory, Laboratory Services Division, University of Guelph, Guelph, ON, Canada, N1H 6R8.	DVM MSc PhD Diploma ACVP veterinary pathology	phn: (519) 824-4120 x54537 fax: (519) 821-8072 bmcewen@lsd.uoguelph.ca
Robert Vanderwoude Food Industry Division, OMAF, 1 Stone Road W, Guelph, ON, Canada N1G 4Y2.	DVM meat inspection	phn: (519) 826-4361 fax: (519) 826-4375 robert.vanderwoude@omaf.gov.on.ca
Dr. Bruce McNab, Research & Corporate Services Division, OMAF, 1 Stone Road W., Guelph, ON, Canada N1G 4Y2.	DVM PhD epidemiology and risk assessment	phn: (519) 826-4178 fax: (519) 826-4211 bruce.mcnab@omaf.gov.on.ca

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Appendix III

OAHSN Annual Summary Statistics 2002

Subject	Cattle	Swine	Poultry	Small ruminants	Equine
Number of farms (2001 census)	23736	4972	1,100	ND	ND
Number of animals (2001 census)	2,268,000	3,400,000	43,624,000	400,000 (est)	325,000
Provincial abattoir inspections 2002 (total)	117,264	464,575	19,274,740	262,197	ND
Salesyard inspections 2002 (total)	888,581	175,792	ND	165,942	6,652
AHL cases - total (2002)	8506	2237	4152	559	7163
AHL pathology cases (2002)	768	381	265	191	479

ND = no data available

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Ontario Animal Health Surveillance Network

Author: Paul Innes - Veterinary Epidemiologist/OMAF
Creation Date: 15 September 2000
Last Reviewed: 12 August 2003

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- University of Guelph - www.uoguelph.ca
- Animal Health Laboratory - www.uoguelph.ca/labserv
- CFIA - www.cfia-acia.agr.ca
- Health Canada - www.hc-sc.gc.ca
- Agriculture Canada - www.agr.ca
- Dairy Farmers of Ontario - www.milk.org
- Ontario Dairy Herd Improvement Corporation - www.ontdhi.com
- Ontario Cattlemen's Association - www.cattle.guelph.on.ca
- Ontario Pork - www.ontariopork.on.ca
- Canadian Animal Health Network - www.cahnet.org
- Association of Public Health Epidemiologists in Ontario - www.cehip.org/apheo

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